

What is claimed is:

1. A method by which a programmable device (10), used for producing music based on a digital music file indicating instructions for producing music on different channels, determines which if any channels to mute depending on available resources, the method characterized by:

a step (61), responsive to channel masking data associated with the digital music file and indicating at least one channel masking in different categories for at least one channel, of providing for each category of the channel a complexity-adjusted number of voices based on a relative resource consumption required by the programmable device (10) when producing voices in the category; and

a step (62), responsive to the complexity-adjusted numbers of voices for respective categories for the channel masking, of providing a total voice requirement corresponding to the channel masking.

2. A method as in claim 1, wherein the channel masking data indicates masking of at least one channel in terms of a number of voices required to play the music for the channel and partitioned among different categories of music requiring possibly different resources.

3. A method as in claim 2, wherein each complexity-adjusted number of voices is adjusted for complexity by a voice complexity coefficient for the respective category, the complexity coefficients indicating a relative resource consumption required by the programmable device (10) when producing voices in each category.

4. The method of claim 1, wherein the categories include a general musical instrument digital interface (MIDI) category, a

Downloadable Sounds level 2 (DLS2) category, a Downloadable Sounds level 1 (DLS1) category, and a sample category for providing audio processing effects.

5 5. The method of claim 4, characterized in that the audio processing effects include one or more effects indicated by reverb, chorus, flanger, phaser, parametric equalizer, graphical equalizer, or sound according to a three-dimensional sound processing algorithm.

10 6. The method of claim 1, further characterized by: a step (54), responsive to the total voice requirement, of assessing resources available and selecting channel masking to use in playing the digital music file.

15 7. A method for a playing digital music file with instructions for producing music arranged on a plurality of channels, wherein the digital music file includes information about resources required for playing music corresponding to the digital music file and is played by a digital music player with predetermined processing capabilities, the method comprising:

20 organizing the digital music file so that the channels are ranked according to musical importance and assigned a corresponding channel priority;

25 providing a digital music player having a processing requirement calculation means for calculating the device specific consumption of processing resources based on processing complexity information stored in the device; and

30 having the digital music player play the music use a playback control adjusting means for selecting the playback resources not exceeding the available processing resources of the digital music player, as controlled by the processing requirement calculation means;

the method characterized in that:

the digital music file information is classified into at least one predefined voice category corresponding to a digital music player voice architecture configuration such that the digital music player calculates the processing requirements based on the information in the digital music file and the processing complexity information so as to predict the processing requirements for different voice resources prior to the playback of the digital music file.

8. The method of claim 7, characterized in that the playback resource requirement information contains voice classification information.

9. The method of claim 8, characterized in that the voice classification information defines DLS voice configurations and audio processing effects.

10. The method of claim 9, characterized in that the audio processing effects include one or more effects indicated by reverb, chorus, flanger, phaser, parametric equalizer, graphical equalizer, or sound according to a three-dimensional sound processing algorithm.

11. The method of claim 7, characterized in that the playback resource requirement information contains MIV information.

12. The method of claim 7, characterized in that the processing complexity information is a voice complexity coefficient VCC.

13. The method of claim 7, characterized in that the digital music player voice architecture configuration is a DLS1 voice architecture.

14. The method of claim 7, characterized in that the digital

music player voice architecture configuration is a DLS2 voice architecture.

15. The method of claim 7, characterized in that the digital music player is a MIDI synthesizer.

5 16. The method of claim 7, characterized in that the digital music file is an XMF file.

17. The method of claim 7, characterized in that the playback control adjusting means uses channel masking for adjusting the processing load.

10 18. The method of claim 7, characterized in that a playback resource adjustment decision is made prior to the playback of the digital music file.

15 19. The method of claim 7, characterized in that the digital music player voice architecture configuration can be adjusted dynamically during the playback.

20. The method of claim 7, characterized in that the digital music player voice architecture can represent multiple different voice configurations in parallel for the playback of one digital music file.

20 21. A method for playing a digital music file with instructions for producing music arranged on a plurality of channels, wherein the digital music file includes information about resources required for playing music corresponding to the digital music file and is played by a digital music player with predetermined processing capabilities, the method comprising:

25 organizing the digital music file so that the channels are ranked according to musical importance and assigned a corresponding channel priority;

providing a digital music player having a processing requirement calculation means for calculating the device specific consumption of processing resources based on processing complexity information stored in the device; and

5 having the digital music player play the music use a playback control adjusting means for selecting the playback resources of the device controlled by processing requirement calculation means;

the method characterized in that:

10 the digital music file information contains playback resource requirement information classified into at least one category corresponding to a digital music player configuration with known processing requirements, and device specific information is utilized by the processing requirement
15 calculation means (CC) to ensure that the digital music player is able to play the music corresponding to the digital music file without exceeding the available resources.

22. A method for playing a digital music file with instructions for producing music arranged on a plurality of channels, wherein
20 the digital music file includes information about resources required for playing music corresponding to the digital music file and is played by a digital music player with predetermined processing capabilities, the method comprising:

25 organizing the digital music file so that the channels are ranked according to musical importance and assigned a corresponding channel priority;

30 providing a digital music player having a processing requirement calculation means for calculating the device specific consumption of processing resources based on processing complexity information stored in the device; and

 having the digital music player play the music use a playback control adjusting means for selecting the playback

resources not exceeding the available processing resources of the digital music player, as controlled by the processing requirement calculation means;

the method characterized in that: the digital music player supports device resource management for multiple processing configurations by calculating the total processing requirements based on content dependent processing requirement information and device specific processing complexity information.

23. An apparatus (10) of use in producing music based on a digital music file indicating instructions for producing music on different channels, the apparatus (10) including means for determining which if any channels to mute depending on resources available to the apparatus (10), the apparatus (10) characterized by:

means (61), responsive to channel masking data associated with the digital music file and possibly indicating masking of at least one channel in terms of a number of voices required to play the music for the channel and partitioned among different categories of music requiring possibly different resources, for providing a complexity-adjusted number of voices for each category indicated by the channel masking data for each channel, each complexity-adjusted number of voices adjusted for complexity based on relative resource consumption required by the programmable device (10) when producing voices in each category; and

means (62), responsive to the complexity-adjusted numbers of voices for respective categories for each channel masking, for providing a total voice requirement corresponding to each channel masking.

24. The apparatus (10) of claim 23, wherein the categories include a general musical instrument digital interface (MIDI)

category, a Downloadable Sounds level 2 (DLS2) category, and a Downloadable Sounds level 1 (DLS1) category.

25. The apparatus (10) of claim 23, further characterized by:
means (54), responsive to the total voice requirement, for
5 assessing resources available and selecting channel masking to
use in playing the digital music file.